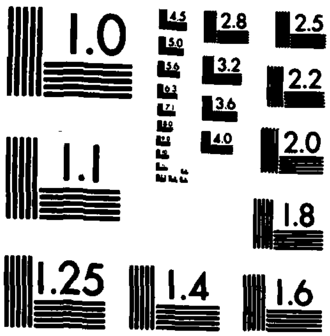
AD-A150 947 STEREOTYPE TRAITS CAN BE PROCESSED AUTOMATICALLY(U) 1/1
PURDUE UNIV LAFAYETTE IN DEPT OF PSYCHOLOGICAL SCIENCES
E R SMITH ET AL. DEC 84 TR-ONR-3 N00014-84-K-0288

UNCLASSIFIED F/G 5/10 NL

END
FILMED
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AD-A150 947

DTIC FILE COPY

2

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: TR-ONR-3	2. GOVT ACCESSION NO.: AD-A150 947	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): Stereotype traits can be processed automatically		5. TYPE OF REPORT & PERIOD COVERED: interim technical report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Eliot R. Smith and Nyla R. Branscombe		8. CONTRACT OR GRANT NUMBER(s): N00014-84-K-0288
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Dept. of Psychological Sciences, Purdue University, W. Lafayette, IN 47907		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: NR 170-969
11. CONTROLLING OFFICE NAME AND ADDRESS: Organizational Effectiveness Research Programs, Office of Naval Research (Code 4420E), Arlington, VA 22217		12. REPORT DATE: Dec. 1984
		13. NUMBER OF PAGES: 34
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report): Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

DTIC ELECTE MAR 0 7 1985 S D E

18. SUPPLEMENTARY NOTES

Submitted to Journal of Experimental Social Psychology

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Social inference, stereotypes, automatic and controlled processing, cognitive processes, social memory

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Stereotypes can theoretically influence information processing in two different ways: through passive activation of stereotype-related trait concepts in a network memory structure, or through consciously generated expectancies and inferences. A priming paradigm is adapted to investigate the role of these two processes in the case of gender and occupational stereotypes. In two experiments, subjects pronounced trait words as rapidly as possible. The trait words were preceded by either a neutral priming word or a social
--OVER--

85 02 19 060

20.

group label (e.g., male or lawyer) with respect to which the traits were stereotype-consistent, inconsistent, or irrelevant. The pronunciation time was measured to index the degree of activation on the trait concept in memory, produced by the stereotyped group label. Results showed that gender stereotypes activate their associated traits automatically whereas occupational stereotypes activate related traits mainly through conscious expectancies. Practical and theoretical implications of the results are discussed, particularly with regard to the prospects for integration of social cognitive and general cognitive models of memory and inference processes.

Stereotype Traits can be Processed Automatically

Eliot R. Smith and Nyla R. Branscombe

Purdue University

14 December 1984

This investigation was supported by grants from the National Science Foundation (BNS 79-22366) and the Office of Naval Research (Contract N00014-84-K-0288) to the first author, and by a Social Sciences and Humanities Research Council of Canada Doctoral Fellowship to the second author. We are indebted to Jim Neely for loaning the equipment used to conduct the research and for helpful comments on all phases of the work.

Requests for reprints should be sent to Eliot R. Smith, Department of Psychological Sciences, Purdue University, West Lafayette, IN 47907.

Stereotype Traits can be Processed Automatically

Abstract

Stereotypes can theoretically influence information processing in two different ways: through passive activation of stereotype-related trait concepts in a network memory structure, or through consciously generated expectancies and inferences. A priming paradigm was adapted to investigate the role of these two processes in the case of gender and occupational stereotypes. In two experiments, subjects pronounced trait words as rapidly as possible. The trait words were preceded by either a neutral priming word or a social group label (e.g., male or lawyer) with respect to which the traits were stereotype-consistent, inconsistent, or irrelevant. The pronunciation time was measured to index the degree of activation on the trait concept in memory, produced by the stereotyped group label. Results showed that gender stereotypes activate their associated traits automatically whereas occupational stereotypes activate related traits mainly through conscious expectancies. Practical and theoretical implications of the results are discussed, particularly with regard to the prospects for integration of social cognition and general cognitive models of memory and inference processes.

Stereotype Traits can be Processed Automatically

Our focus in this paper is on the ways stereotypes are stored in memory and activated to influence the processing of information about other people. Traditionally, stereotypes were considered primarily motivational or personality-based phenomena, products of irrational thought processes on the part of the person holding them. Stereotypes were assumed to be functional, providing the individual with a psychological justification for prejudice (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950; Katz, 1960). Recently, however, a cognitive approach to stereotyping has emerged (Ashmore & Del Boca, 1981; Hamilton, 1981) which is consistent with current overall models of social cognition (Smith, 1984; Wyer & Srull, 1980). This approach considers stereotyping to be a consequence of the way people process information in general. Because people have a limited capacity for processing information, they group (and hence stereotype) people in order to reduce the complexity of the social world--the same function served by the perception of objects in terms of categories (cf. Tajfel & Forgas, 1981).

Within this new perspective, a number of specific questions arise, particularly concerning the way stereotypes are stored in memory and used in forming impressions of other people. There are two major theoretical possibilities, which can best be described within the context of a general model of social inference like that of Smith (1984). Drawing on Anderson's (1983) general cognitive theory, this model posits seperate declarative and procedural memory systems.

Declarative knowledge is propositionally represented in a network memory system (similar to many other cognitive theories) in which retrieval of needed information is directed by the spread of activation from an activated node or concept over network links to semantically associated concepts. Procedural knowledge is represented by productions. Productions are condition-action (or if-then) pairs which operate, when their conditions match patterns of input data, to perform the specific action, such as generating new memory structures, making inferences, or guiding behavior.

The first theoretical possibility is that stereotypes are represented as <u>links in the semantic network declarative memory structure</u>. The link would connect the node representing a social group (such as male) with the node representing a trait concept that is part of the stereotype (such as aggressive). If the male node is activated by incoming information about the gender of a target person, the stereotypic trait nodes would also be activated to some extent by activation spreading along the links in the network. The partially activated trait nodes could then influence the further processing of information about the target person. Numerous studies have demonstrated effects of this sort, supporting the general model of memory (e.g., Collins & Loftus, 1975; Fischler & Goodman, 1978).

This first possibility would constitute a form of "passive" information processing, of which the subject might not be aware. Several studies within social cognition have demonstrated such effects. Higgins, Rholes, and Jones (1977) exposed subjects to traits in a "priming" manipulation and found that they influenced the interpretation

of ambiguous information about a target person in an ostensibly unrelated task, presumably because some activation remained in the trait nodes in memory. Higgins and King (1981) argue that effects of this sort involve a passive, automatic process rather than consciously derived expectancies concerning the target person. Bargh and Pietromonaco (1982) indirectly supported this position by showing effects of priming trait information in a manner that they claimed was outside of subjects' awareness.

The second theoretical possibility is a more active _expectancy concerning the traits of the target person_, generated by inferential procedures. Learning that a target person belongs to a particular group, the subject may consult his or her declarative knowledge about the stereotypic attributes of that group and infer that the target person possesses those attributes. Such a process might well involve conscious awareness by the subject, and might be more subject to variation in strategies, short-term influences on expectations, and social desirability or other biases on the subject's part.

Within the general type of memory model discussed here, there is a well-tested method for separating passive, more automatic effects from active, more expectancy-based effects of activating a group label on processing of traits. The method involves the sequential presentation of a group label (hereafter called the "prime") and a trait term (the "target"). The method relies on two fundamental assumptions. (1) The subject's reaction time to perform some simple task with the target word (such as pronounce it as quickly as possible) indexes the activation of the concept in memory. Quicker times indicate a higher level of

activation. (2) The interval of time (called the stimulus onset asynchrony or SOA) between the presentation of the prime and the target determines the predominant type of processing that is involved. Short intervals allow only the operation of the quicker, passive spreading activation and other more automatic processes. Long SOAs permit the subject's conscious expectancies to operate and even override the prior automatic processing.

Neely (1977) used a method following this outline to examine the influence of a single-word prime on the processing of a single-word target. The prime could be semantically related to the target (e.g., BIRD-ROBIN), related by conscious expectations (e.g., BIRD-LEG when the subject had been told that BIRD would be followed by a body part), unrelated, or neutral (a string of X's). The SOA was short or long, and the subject's task was to press a key to indicate whether the target was a word or a nonword (the lexical decision task). Neely's results showed facilitation (quicker response times relative to the neutral prime condition) for semantically related targets at the short SOA, regardless of whether they came from the consciously expected category, but no inhibition for unrelated targets. At the long SOA, the conscious expectations produced both facilitation for expected targets and inhibition for unexpected targets, regardless of their semantic relationship to the prime. These results, along with others in the literature (e.g., de Groot, 1984) therefore show how both semantic relationships (theoretically represented as links in the network memory structure) and conscious expectations can influence processing of the target, and how their relative influence varies with the SOA.

Neely's study has two significant differences from studies that use sentence fragments as primes and from the current study. First, it requires no high-level conceptual integration by the subjects; they do not have to process the prime and target words together. Studies using sentence fragments as primes (e.g., Stanovich & West, 1983; Forster, 1981) require such integration. The subject might see, for instance, "The banker missed his" as the prime and "train" as the target. This design, like that used in our studies, imposes an extra processing load on subjects: integrating the stimuli to comprehend the entire sentence. In our studies, the subjects are instructed to process the prime (a label of a social group, such as a gender or occupation) and the target (a trait) together, to consider it as a two-word description of a person. However, most studies of the effects of sentence primes have not manipulated SOA (but see Stanovich & West, 1979).

Second, many studies (including ours) use the time to pronounce the target word, rather than to decide whether or not it is a word, as the dependent measure indicating the activation of the concept in memory. The pronunciation task seems to be a more valid measure of activation, according to a number of recent studies (West & Stanovich, 1982; Forster, 1981; Seidenberg, Waters, Sanders, & Langer, 1984), for the lexical decision task seems to involve some "post-lexical processing" which is not directly related to the activation level of the word but nevertheless influences response times.

One prior study using a priming method to investigate social stereotypes (Gaertner & McLaughlin, 1983) unfortunately relied on the lexical decision task, making their results ambiguous. Post-lexical

processes (such as judgments about the appropriateness of a particular group-trait combination) may influence response times for lexical decision judgments more than they influence pronunciation times, as the studies cited above show. In addition, Gaertner and McLaughlin presented the prime and target words simultaneously, rather than varying SOA.

Our studies, by using social group labels as primes and trait adjectives as targets, are aimed at determining the effects of the two types of information processing described above, in the area of social stereotypes. If our efforts are successful, they have several implications. (1) The most significant at the theoretical level would be an extension of the domain of the two-process model of priming effects to include social stereotypes, and some conclusions about whether stereotypes can be processed automatically or whether they require conscious expectations. (2) The results will show whether different types of stereotypes are stored and processed similarly. Our studies use both gender and occupational stereotypes, so we can examine the above question with respect to both types. (3) The results will also permit inferences concerning the unipolar versus bipolar storage of trait concepts in memory. If traits are stored in unipolar fashion, then activating the male node would activate a stereotypically related concept like aggressive but would not activate unaggressive, the other end of the dimension. Bipolar storage implies that activating the male node would activate both ends of the trait dimension (e.g., both aggressive and unaggressive), relative to a neutral prime.

These findings may also have practical implications. If stereotypes are applied automatically, they may be more difficult to modify than would be the case if they are applied via conscious expectancies and inferences. The latter process might be changeable simply by giving people new declarative information.

The task used here also might yield an effective nonreactive measure of stereotype possession and use by subjects. Subjects are not aware that small differences in the speed with which they are able to pronounce words can index the degree to which social groups and stereotyped traits are linked in their memory, so they are unlikely to shape these responses to give a socially desirable nonstereotyped appearance.

<u>Hypotheses</u>

Specific hypotheses based on the above discussion are as follows. (1) For the gender stereotype, which is well-learned, automatic stereotype-based processing at the short SOA should be observed. Thus, stereotype-consistent traits should be processed quickly relative to stereotype-irrelevant and stereotype-inconsistent traits. However, subjects may be defensive and unwilling to rely on gender stereotypes on a conscious level (e.g., to expect that a female will be nurturant and a male aggressive). Thus, with the long SOA, when the effects of conscious expectancies are visible, smaller effects of gender labels are expected.

(2) Occupational stereotypes may present the opposite pattern. Since they are generally less well learned, little effect at the short SOA is expected. However, subjects should be less defensive about using

occupational stereotypes, so their effects may show up in terms of conscious expectancies at the long SOA, where consistent traits should be processed faster than irrelevant or inconsistent ones.

(3) The polarity of storage of traits will be evidenced by differences between stereotype-irrelevant and -inconsistent traits. At the long SOA, when conscious expectancies have time to develop, inconsistent traits should be the slowest because they are completely unexpected. At the short SOA, two patterns are possible. Inconsistent traits might be worst (or equal to irrelevant traits) at the short SOA as well, suggesting unipolar representation of traits in memory. However, if inconsistent traits are not as slow as irrelevant traits at the short SOA, bipolar representation of traits is suggested: the inconsistent trait derives some activation from the expected consistent trait which is its opposite.

In the design, these three hypotheses translate into effects within the priming condition x gender/occupation x SOA interaction.

Method

Experiments 1 and 2 have very similar designs and procedures. Experiment 1 will first be described in full and then the differences noted for Experiment 2. Separate samples of 72 male undergraduates participated in each experiment for course credit.

Experiment 1

Subjects were tested individually. Upon arrival at the laboratory they were read general instructions informing them that on each trial a two-word person description would be presented on a

computer screen. Subjects were instructed to pay close attention to both words on each trial, though on some trials the first word would simply be READY, which was said to indicate that the second (trait) word was the only available description of the person. The subject's task was to read the person description and pronounce the second word as quickly as possible without making errors. Subjects received 30 practice trials to familiarize them with the materials and procedure; these trials contained mostly stereotype-consistent word pairs to reinforce the idea that the materials constituted person descriptions.

The 48 experimental trials included 12 from each priming condition: stereotype-consistent, -inconsistent, -irrelevant, and neutral. Except for the neutral condition, where the prime was always READY, half of the trials used gender labels (MALE or FEMALE) as primes and half used occupation labels. Examples of prime-trait pairs from the different priming conditions are: consistent, female-sensitive and accountant-quiet; inconsistent, male-graceful and mortician-jovial; irrelevant, entertainer-competitive and female-inquisitive. The materials were constructed and counterbalanced across subjects so that each target trait appeared equally often in every priming condition. For example, the female stereotype-consistent traits appeared for different groups of subjects with the neutral READY prime, as male stereotype-inconsistent traits, and as occupation stereotype-irrelevant traits.[1] The word pairs were presented in a random order for each subject.

The time between the onset of the prime and target words was also varied. For half the trials (short SOA), the target appeared 250 msec after the onset of the prime. The long SOA was 1200 msec. SOA was also counterbalanced across subjects so that every prime-target pair was used equally often in both SOA conditions.

The prime was always presented directly above the target on a CRT screen, and both words were presented in uppercase letters. The target word was always partially covered with semi-transparent tape to produce some visual degradation. This has been found to increase the magnitude of priming effects (Meyer, Schvaneveldt, & Ruddy, 1975; Stanovich & West, 1979) and therefore increase the sensitivity of the study. The time taken by the subject to begin pronouncing the target word was recorded by the computer (interfaced to a microphone and voice-activated relay). After the subject made his response, three seconds elapsed before the next trial began.

Experiment 2

Experiment 2 followed essentially the same design and procedures as Experiment 1 with only two differences. First, the stimulus lists were rearranged based on the pronunciation response times in the neutral priming condition from Experiment 1, so that each subset of items (used for counterbalancing priming conditions) took approximately the same average time to pronounce in the absence of any priming effect. This should increase the overall power to detect priming effects by decreasing between-list differences. Second, the long SOA was changed to 600 msec from the 1200 msec used in Experiment 1. This was done because analyses of the Experiment 1 data showed few effects at that

very long SOA, and we assumed that it was simply too long, so that any priming effects had dissipated.

Analysis

The data from the two studies will be analyzed together. Each experiment involves a stereotype type (Gender/Occupation) by Priming Condition (stereotype consistent/ inconsistent/ irrelevant/ neutral) by SOA (short/long) design, 2 x 4 x 2, all within subjects. The stimulus lists were counterbalanced across subjects, as mentioned above, but the counterbalancing factors are not discussed here for simplicity. Because of the counterbalancing, error terms in the design take account of both subject and item variability (differences in time taken to pronounce different target words). Thus, the analyses help to establish the generalizability of the effects over both subjects and items (cf. Wike & Church, 1976).

The two studies were analyzed together in a 2 x 4 x 2 x 2 design, with the last factor being Experiment (1 vs. 2), between subjects. Combining the experiments for analysis increases the total N and thus power, and also helps assess the generalizability of the results (i.e., whether or not the experiment factor interacts with the factors of interest). MANOVA was used, and the multivariate significance tests or the more powerful mixed-model tests will be reported as appropriate, depending on whether or not the mixed-model assumptions were violated (assessed by Bartlett's test of sphericity).

Results and Discussion

Table 1 shows the significance levels of the effects tested. The main effect of priming condition (across gender and occupation and

short and long SOA) is significant, and shows that stereotype-inconsistent and (especially) irrelevant traits (*M*s = 805 and 815 msec respectively) are slower than traits in the consistent and neutral priming conditions (*M*s = 797 and 796 msec). These effects (9-19 msec differences) are within the range of those previously obtained with single-word primes and the pronunciation task (e.g., Seidenberg et al., 1984, p. 323). This suggests that overall, the method is tapping the prime-target relationships, as prior research had suggested.

There is also a significant main effect of SOA; responses are slower for the short than for the long SOA (*M*s = 839 and 767 msec). This type of effect is typical of studies in which prime-target SOA is varied, and simply represents the differential effectiveness (depending on SOA) of the prime as a "warning signal" that alerts subjects to the approach of the target for which a response is required (Posner & Boies, 1971).

Table 1 about here.

The Experiment factor was involved in three significant interactions. One was Experiment x Gender/Occupation. In experiment 1 responses to gender traits were 11 msec faster than to occupation traits, while in Experiment 2 they were 14 msec slower. This effect is uninterpretable since it collapses across all priming conditions and SOAs.

The Experiment x SOA and Experiment x SOA x Condition interactions were also significant. Since the long SOA differed between Experiments 1 and 2, as described above, and the effect of SOA itself on pronunciation time is of no interest, the Experiment x SOA effect is expected and not problematic. The Experiment x SOA x Condition interaction revealed that the effects of condition (facilitation for consistent traits relative to irrelevant and inconsistent ones) were more marked in Experiment 1 than in Experiment 2 at the short SOA. Effects at the long SOA (especially inhibition for irrelevant targets) were larger in Experiment 2; as noted above, the failure to find any effects at the very long SOA in the first experiment in part motivated the change of the long SOA for Experiment 2. The absence of other significant interactions with Experiment points to the generalizability of the main findings (Condition x Gender/Occupation x SOA interaction) across the two experiments.

Table 2 about here.

The major interest in the results centers on the three-way interaction of Priming Condition x Gender/Occupation x SOA, shown in Table 2. As predicted, this interaction is significant. To interpret this complex interaction, we break it down into individual components with planned comparisons. These comparisons stress the effects of Gender/Occupation and SOA on the means for the stereotype priming conditions, rather than comparisons between stereotype and neutral priming conditions, for reasons to be discussed below (see also Jonides & Mack, 1984).

Considering the consistent priming condition alone, there was an interaction of Gender/Occupation x SOA: $t(384) = 2.34$, $p < .05$. Consistent traits are responded to more quickly in the gender-short SOA and occupation-long SOA conditions than in the gender-long and occupation-short conditions. For the irrelevant condition, the same interaction is nearly significant, with $t(384) = 1.82$, $p < .07$. Irrelevant traits are relatively slower in the gender-short and occupation-long conditions than in the gender-long and occupation-short conditions. This effect is mainly attributable to the gender-short SOA irrelevant condition, which had a very long mean response time. The interaction for the inconsistent condition shows the same pattern but does not attain significance. Figure 1 portrays these interactions graphically.

Figure 1 about here.

These results indicate that the pattern for gender stereotypes is essentially as predicted. At the short SOA, stereotype-consistent traits are processed approximately 24 msec more rapidly than inconsistent traits; irrelevant traits take longer still. Thus, the stereotype activates related traits by a fast-acting process. At the long SOA, if anything, consistent traits are slightly _worse_ than inconsistent (by 12 msec), suggesting that when conscious expectancies for gender are involved, subjects actually expect counter-stereotypic rather than stereotypic traits.

For occupation stereotypes, the effects at the short SOA are small, as predicted. At the long SOA, the consistent traits are pronounced approximately 20 msec more quickly than the irrelevant and inconsistent traits. This clearly shows a difference in the time course of stereotype activation between gender and occupation stereotypes: occupation stereotypes are activated more slowly. One could argue that these long-SOA effects arise from a passive spread of activation that is slower-acting for occupation than for gender stereotypes, but other research shows the spread of activation to be nearly instantaneous (cf. Anderson & Pirolli, 1984). Based on prior research, we attribute the long-SOA results to the generation of conscious expectancies.

Are traits represented in memory in unipolar or bipolar fashion? The results appear to support the bipolar hypothesis, though an alternative interpretation will be discussed below. This issue is investigated by comparing irrelevant with inconsistent traits at the short SOA, and this comparison is significant for gender stereotypes ($\underline{t}(384) = 2.64$, $\underline{p} < .01$). (Occupation stereotypes appear not to influence processing at the short SOA at all, so they do not provide any evidence on this issue.) Inconsistent traits are processed more quickly than irrelevant ones, suggesting that they attain some activation from the directly stereotype-linked consistent traits.

There is one important point at which the results of this study differ from those of the majority of previous studies that use priming methods to investigate influences of context on the speed of processing nontrait target words. This point concerns facilitation and inhibition, commonly defined by the differences between experimental conditions and

a baseline neutral priming condition. Most studies using single-word primes have found facilitation from related primes, but little inhibition from unrelated primes, at a short SOA (but see Antos, 1979). The theory of Posner and Snyder (1975), in fact, appears to rule out the possibility of inhibition from the quick-acting spreading activation process that is assumed to operate at the short SOA. However, comparisons with our neutral condition show inhibition at the short SOA (particularly with gender stereotype-irrelevant words).

Three factors may help explain this difference. First, the identification of facilitation versus inhibition depends on the neutral prime used. Different studies have used different neutral primes (including, for example, a string of XXX's) as well as the word READY, used here. Different "neutral" conditions can differ substantially in mean response time (Forster, 1981; Jonides & Mack, 1984; Stanovich & West, 1983). For example, a slower neutral condition in this study would reduce the apparent amount of inhibition and increase the amount of facilitation.

Second, the nature of priming effects has been shown to depend upon the type of relationship between the prime and target (Becker, 1980). For example, high associates (DOCTOR-NURSE) may produce different results from instance-category (ROBIN-BIRD) or category-instance (BIRD-ROBIN) stimulus materials. Therefore, it would not be surprising if social group-trait materials (FEMALE-NURTURANT) produced effects that differ in some details as well.

Finally, studies that use more than a single priming word obtain different patterns of results than those that use single-word primes. Some experiments have used an entire sentence stem, rather than one word, as a context for the target word; this imposes a high-level integration task as subjects attempt to interpret the whole sentence. Our studies use two-word person descriptions, which impose a different type of high-level integration task: considering the description as a person and forming an integrated impression of the personality. Stanovich and West (1983) and Forster (1981) have obtained results demonstrating inhibition in a word-pronunciation task with incongruous sentence contexts. (Stanovich & West obtained such results only when the target word was presented with visual degradation, which we used in this study.) Thus, if one accepts the argument that forming an integrated personality impression imposes a processing demand similar to integrating the meaning of an entire sentence, the most closely analogous prior studies have obtained evidence of inhibition. However, the SOA in these studies was not as short as the one we used, though measurement of SOA with sentence primes poses obvious problems (e.g., should one compute SOA from the beginning of the presentation of the sentence or from the presentation of the last word preceding the target?).

In combination, these considerations raise questions about the interpretation of the "neutral" priming condition in this study, and indeed about what would be an appropriate neutral condition for studies of priming involving social groups and trait words (cf. Jonides & Mack, 1984). Perhaps PERSON might be an appropriate neutral prime. In any

case, the current discussion de-emphasizes the neutral condition in interpreting comparisons among the means in Table 2.

General Discussion

The results of this study suggest that stereotypes can have effects that are mediated either passively and automatically or through conscious expectations. As predicted, gender stereotypes influence processing most strongly at the short SOA (interpreted as involving more automatic processing), producing increased activation on stereotype-consistent traits relative to irrelevant and inconsistent traits. At the long SOA, subjects' presumed unwillingness to consciously endorse gender stereotypes make the effects disappear and even reverse to some extent (inconsistent traits are processed more rapidly than consistent traits).

Our predictions were also fulfilled in the case of occupational stereotypes. Perhaps because these are less well-learned than gender stereotypes, they had little effect at the short SOA (via automatic processes). They had the predicted effects at the long SOA when conscious expectancies could be brought into play.

The practical significance of these results has to do with the possibility of nonconscious, passive stereotype-based processing. A perceiver's desire to form an impression of another person in an unbiased way, and even a conscious belief that the stereotype is untrue, will not block this automatic processing. Only building up new connections in the person's social memory and strengthening them with repeated use over time may be able to modify such automatic processes.

These conclusions are consistent with Hepburn and Locksley's (1983) recent evidence suggesting that people are not aware of the extent of stereotypic influences on their judgments.

Another practical implication concerns the measurement of stereotypes. Memory researchers have recently identified instances of dissociation between conscious awareness of prior exposure to a stimulus (and ability to report that exposure in tests of recall and recognition) and other, more subtle and nonconscious effects of exposure. These results (e.g., Tulving, Schacter, & Stark, 1982) suggest that traditional forms of memory test are incomplete indices of the enduring effects of exposure to a stimulus on a person's later information processing. Some of these effects are consciously mediated and others, seemingly, are not.

The case with stereotypes may be similar. These results point to a dual use of stereotypes, in conscious, expectancy-based and nonconscious, passive modes. Many traditional means of measuring stereotypes (e.g., the Katz & Braly paradigm) assess only conscious awareness of the stereotype content, while leaving unmeasured the potential of a stereotype to direct automatic processing by activating trait concepts. This point goes beyond the issue of subjects' consciously distorting their responses to appear unstereotyped. Even a totally honest subject is intrinsically unable to report on many aspects of his or her memory and cognitive processes, and these results suggest that stereotypes can have effects that even in principle are inaccessible to the subject. The results of this study may provide the basis for the development of measures that can access these unaware

aspects of people's possession and use of stereotypes, even in cases where subjects are unwilling to admit to their stereotypes.

The substantive results suggest that different types of stereotypes (gender and occupations) have their effects in different ways. Racial and ethnic stereotypes are presumably more similar to gender stereotypes (in being socialized relatively early and in subjects' unwillingness to consciously rely on them) but this study did not examine them. One prior study, by Gaertner and McLaughlin (1983), examined racial stereotypes with a method related to this one, and found evidence that positive attributes were responded to more quickly when paired with WHITE rather than BLACK or NEGRO as a prime. No difference was observed in the speed of responding to negative trait terms. (Note that generally positive versus negative traits were used, rather than traits that were specifically related to racial stereotypes.) However, their study's reliance on the lexical decision task, as mentioned above, makes their results only suggestive. The study also did not vary SOA, so there is no evidence as to whether the stereotype-based processing of the traits was mediated by automatic processes or conscious expectancies.

Our findings also have implications at a theoretical level. Most generally they show the fruitfulness of fitting social-psychological phenomena into a general cognitive model (Anderson, 1983) that encompasses memory structures, consciously controlled and automatic information processing, and the like, as argued by Smith (1984). Such bridge-building between social and cognitive psychology may benefit not only the former but also the latter, as cognitive psychologists begin to

realize that social phenomena such as stereotypes also have implications for models of memory and cognition and can potentially be encompassed within a broad model of social and nonsocial cognition.

This study leaves several unanswered questions. We have assumed that subjects followed our instructions to consider the two-word person descriptions as persons, but since the only overtly required task was the pronunciation of the target trait word, it is conceivable that subjects might have ignored those instructions. Subjects did report, in debriefing, that they attempted to follow the instructions. Also, if they had uniformly ignored the priming word, no priming effects would have been obtained. Further research might include another task (such as a liking judgment) on some trials to ensure that subjects treat the materials as social stimuli.

Another unresolved issue concerns the assumption that stereotypes of the social groups used here are unitary. Recent research results (e.g., Deaux, Winton, Crowley, & Lewis, in press) call this assumption into question with respect to gender stereotypes. Perhaps people have many stereotypes of different types of men and women (e.g., career woman, housewife, glamorous actress type) which are linked to different traits. This possibility qualifies the tentative conclusion we drew above concerning the unipolar versus bipolar representation of trait concepts in memory. The results suggested that the counterstereotypic trait derived some activation from the prime, for it was pronounced more quickly than a completely irrelevant trait. However, if subjects possess a stereotype for a "liberated woman" type who is aggressive, competitive, and so on, and also a "liberated man"

type who is gentle and empathetic, these results might reflect processing based on these sub-stereotypes, the opposites of the traditional stereotypes, rather than bipolar trait storage in memory. Further research must resolve this possibility.

A final unresolved issue is the relationship between these results and those of studies of priming with nonsocial materials. Further research using different types of stereotypes, such as ethnic groups, and perhaps investigating different types of prime-target relationship seems to be called for. The integration of social cognition and its well-tested findings and theoretical generalizations (e.g., concerning stereotyping effects; Hamilton, 1981) with general models of memory and cognitive processes (cf. Smith, 1984) is a worthy long-term goal for such research.

Footnote

1. The prime-target pairs for the occupational trials were selected on the basis of pretest ratings supplied by 16 male and 16 female undergraduates. On a 0 to 10 scale, subjects rated the likelihood that a member of a given occupation would possess a particular personality trait. Traits that were rated as highly probable for an occupation were selected as stereotype-consistent, and those rated as improbable were used as stereotype-inconsistent. The materials for the gender trials were based on the components of gender stereotypes outlined by Deaux and Lewis (1983).

References

Adorno, T. W., Frenkel-Brunswik, E., Levinson, D. J., & Sanford, R. N. (1950). The authoritarian personality. New York: Harper.

Anderson, J. R. (1983). The architecture of cognition. Cambridge, MA: Harvard University Press.

Anderson, J. R., & Pirolli, P. L. (1984). Spread of activation. Journal of Experimental Psychology: Learning, Memory, and Cognition, 10, 791-798.

Antos, S. J. (1979). Processing facilitation in a lexical decision task. Journal of Experimental Psychology: Human Perception and Performance, 5, 527-545.

Ashmore, R. D., & Del Boca, F. K. (1981). Conceptual approaches to stereotypes and stereotyping. In D. L. Hamilton (Ed.), Cognitive processes in stereotyping and intergroup behavior. Hillsdale, NJ: Erlbaum.

Bargh, J. A., & Pietromonaco, P. (1982). Automatic information processing and social perception: The influence of trait information presented outside of conscious awareness on impression formation. Journal of Personality and Social Psychology, 43, 437-449.

Becker, C. A. (1980). Semantic context effects in visual word recognition: An analysis of semantic strategies. Memory and Cognition, 8, 493-512.

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. Psychological Review, 82, 407-428.

Deaux, K., & Lewis, L. L. (1983). Components of gender stereotypes. Psychological Documents, 13, 25. (MS. No. 2583).

Deaux, K., Winton, W., Crowley, M., & Lewis, L. (in press). Levels of categorization and components of stereotypes. Social Cognition.

de Groot, A. M. B. (1984). Primed lexical decision: Combined effects of the proportion of related prime-target pairs and the stimulus-onset asynchrony of prime and target. Quarterly Journal of Experimental Psychology, 36A, 253-280.

Fischler, I., & Goodman, G. O. (1978). Latency of associative activation in memory. Journal of Experimental Psychology: Human Perception and Performance, 4, 455-470.

Forster, K. I. (1981). Priming and the effects of sentence and lexical contexts on naming time: Evidence for autonomous lexical processing. Quarterly Journal of Experimental Psychology, 33A, 465-495.

Gaertner, S. L., & McLaughlin, J. P. (1983). Racial stereotypes: Associations and ascriptions of positive and negative characteristics. Social Psychology Quarterly, 46, 23-30.

Hamilton, D. L., (Ed.) (1981). Cognitive processes in stereotyping and intergroup behavior. Hillsdale, NJ: Erlbaum.

Hepburn, C., & Locksley, A. (1983). Subjective awareness of stereotyping: Do we know when our judgments are prejudiced? Social Psychology Quarterly, 46, 311-318.

Higgins, E. T., & King, G. (1981). Accessibility of social constructs: Information-processing consequences of individual and contextual variability. In N. Cantor & J. F. Kihlstrom (Eds.), Personality, cognition, and social interaction. Hillsdale, NJ: Erlbaum.

Higgins, E. T., Rholes, W. S., & Jones, C. R. (1977). Category accessibility and impression formation. Journal of Experimental Social Psychology, 13, 141-154.

Jonides, J., & Mack, R. (1984). On the cost and benefit of cost and benefit. Psychological Bulletin, 96, 29-44.

Katz, D. (1960). The functional approach to the study of attitudes. Public Opinion Quarterly, 24, 163-204.

Meyer, D. E., Schvaneveldt, R. W., & Ruddy, M. G. (1975). Loci of contextual effects on visual word recognition. In P. M. A. Rabbitt & S. Dornic (Eds.), Attention and Performance V. New York: Academic.

Neely, J. H. (1977). Semantic priming and retrieval from lexical memory: Roles of inhibitionless spreading activation and limited-capacity attention. Journal of Experimental Psychology: General, 1, 226-254.

Posner, M. I., & Boies, S. J. (1971). Components of attention. Psychological Review, 78, 391-408.

Posner, M. I., & Snyder, C. R. R. (1975). Attention and cognitive control. In R. L. Solso (Ed.), Information processing and cognition: The Loyola symposium. Hillsdale, NJ: Erlbaum.

Seidenberg, M. S., Waters, G. S., Sanders, M., & Langer, P. (1984). Pre- and postlexical loci of contextual effects in word recognition. Memory and Cognition, 12, 315-328.

Smith, E. R. (1984). Model of social inference processes. Psychological Review, 91, 392-413.

Stanovich, K. E., & West, R. F. (1979). Mechanisms of sentence context effects in reading: Automatic activation and conscious attention. Memory and Cognition, 7, 77-85.

Stanovich, K. E., & West, R. F. (1983). On priming by a sentence context. Journal of Experimental Psychology: General, 112, 1-36.

Tajfel, H., & Forgas, J. P. (1981). Social categorization: Cognitions, values, and groups. In J. P. Forgas (Ed.), Social cognition. London: Academic.

Tulving, E., Schacter, D. L., & Stark, H. A. (1982). Priming effects in word-fragment completion are independent of recognition memory. Journal of Experimental Psychology: Learning, Memory, and Cognition, 8, 336-342.

West, R. F., & Stanovich, K. E. (1982). Source of inhibition in experiments on the effect of sentence context on word recognition. Journal of Experimental Psychology: Learning, Memory, and Cognition, 8, 385-399.

Wike, E. C., & Church, J. D. (1976). Comments on Clark's "The Language-as-Fixed-Effect Fallacy." Journal of Verbal Learning and Verbal Behavior, 15, 249-256.

Wyer, R. S., & Srull, T. K. (1980). The processing of social stimulus information: A conceptual integration. In R. Hastie, T. M. Ostrom, E. B. Ebbesen, R. S. Wyer, D. L. Hamilton, & D. E. Carlston (Eds.), Person memory: The cognitive basis of social perception (pp. 227-300). Hillsdale, NJ: Erlbaum.

Table 1

Tests of Significance for Experimental Factors

Effect	F	df	p
Experiment	0.96	1	.329
Experiment x Cond	2.26	3	.085
Condition	4.03	3	.009
SOA	162.92	1	.000
Experiment x SOA	30.66	1	.000
Gender/Occupation	0.15	1	.697
Experiment x Gen/Occ	6.60	1	.011
Experiment x Cond x SOA	2.68*	3	.047
Cond x SOA	1.09*	3	.353
Expt x Cond x Gen/Occ	0.39	3	.758
Cond x Gen/Occ	1.27	3	.288
SOA x Gen/Occ	0.05	1	.831
Expt x SOA x Gen/Occ	2.59	1	.110
Expt x Cond x SOA x Gen/Occ	1.08*	3	.340
Cond x SOA x Gen/Occ	2.97*	3	.032

Note: Denominator df for the F ratios = 128, except that F ratios indicated by * are the more powerful repeated-measures (mixed-model) tests, calculated for terms for which the Bartlett test of sphericity shows no violation of the assumptions. They have (3,384) df.

Table 2

Mean Pronunciation Time by SOA, Stereotype Type,

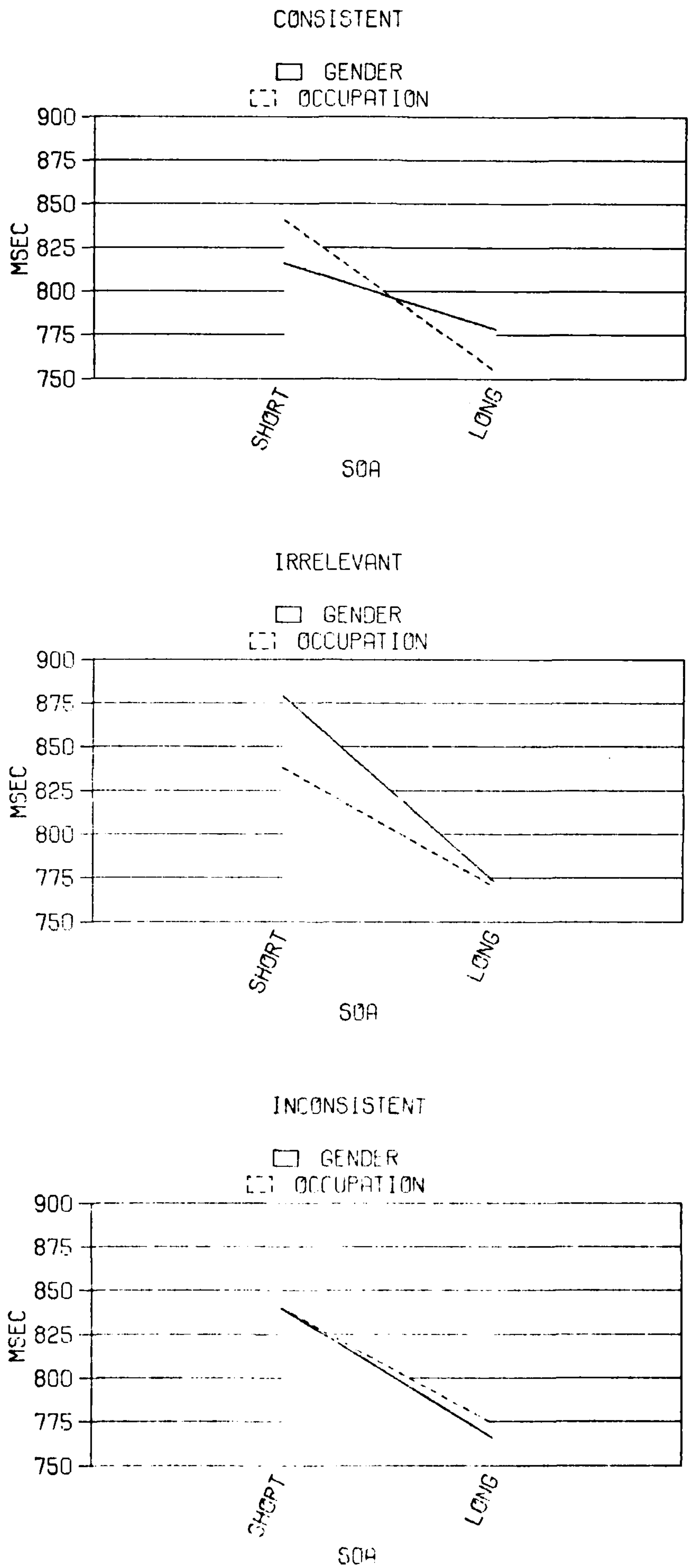
and Priming Condition, across Two Experiments

Prime-Target Relationship	SOA Short	SOA Long
Gender Stereotypes		
Consistent	816 (+ 7)	778 (-20)
Neutral Prime	823	758
Irrelevant	879 (-56)	773 (-15)
Inconsistent	840 (-17)	766 (- 8)
Occupation Stereotypes		
Consistent	841 (- 5)	754 (+11)
Neutral Prime	836	765
Irrelevant	838 (- 2)	770 (- 5)
Inconsistent	840 (- 4)	774 (- 9)

Note: Times are in msec. The figures in parentheses represent facilitation or inhibition scores relative to the neutral condition (+ indicating facilitation, - inhibition).

Figure caption

Figure 1. Mean Pronunciation Response Time, by Stereotype Type (Gender or Occupation) and SOA (Short or Long), for Consistent, Irrelevant, and Inconsistent Prime-Target Relationships


CONSISTENT
GENDER
OCCUPATION
900
875
850
825
800
775
750
MSEC
SHORT
LONG
SOA
IRRELEVANT
GENDER
OCCUPATION
900
875
850
825
800
775
750
MSEC
SHORT
LONG
SOA
INCONSISTENT
GENDER
OCCUPATION
900
875
850
825
800
775
750
MSEC
SHORT
LONG
SOA

LIST 2
OPNAV

Deputy Chief of Naval Operations
(Manpower, Personnel, and Training)
Head, Research, Development, and
Studies Branch (OP-01B7)
1812 Arlington Annex
Washington, DC 20350

Director
Civilian Personnel Division (OP-14)
Department of the Navy
1803 Arlington Annex
Washington, DC 20350

Deputy Chief of Naval Operations
(Manpower, Personnel, and Training)
Director, Human Resource Management Division
(OP-15)
Department of the Navy
Washington, DC 20350

~~Chief of Naval Operations~~
~~Head, Manpower, Personnel, Training~~
~~and [illegible] Team (Op-964D)~~
~~The Pentagon, 4A478~~
~~Washington, DC 20350~~

~~Chief of Naval Operations~~
~~Assistant, Personnel Logistics~~
~~Planning (OP-987H)~~
~~The Pentagon, 5D~~
~~Washington, DC 20350~~

LIST 3
NAVMAT & NPRDC

NAVMAT

Program Administrator for Manpower,
Personnel, and Training
MAT-0722
800 N. Quincy Street
Arlington, VA 22217

~~Naval Material Command~~
~~Management Training Center~~
~~NAVMAT [illegible]~~
~~Jefferson [illegible] Bldg #2, Rm 150~~
~~1421 Jefferson Davis Highway~~
~~Arlington, VA 20360~~

~~Naval Material Command~~
~~Director, Productivity Management Office~~
~~MAT-00K~~
~~Crystal [illegible]~~
~~Room [illegible]~~
~~Washington, DC 20360~~

~~Naval Material Command~~
~~Deputy Chief of Naval Material, MAT-03~~
~~Crystal [illegible]~~
~~Room 23[illegible]~~
~~Washington, DC 20360~~

Naval Personnel R&D Center (4 copies)
Technical Director
Director, Manpower & Personnel
Laboratory, Code 06
Director, System Laboratory, Code 07
Director, Future Technology, Code 41
San Diego, CA 92152

Navy Personnel R&D Center
Washington Liaison Office
Ballston Tower #3, Room 93
Arlington, VA 22217

4420E DISTRIBUTION LIST

LIST 1
MANDATORY

Defense Technical Information Center (12 copies)
ATTN: DTIC DDA-2
Selection and Preliminary Cataloging Section
Cameron Station
Alexandria, VA 22314

Library of Congress
Science and Technology Division
Washington, D.C. 20540

Office of Naval Research (3 copies)
Code 4420E
800 N. Quincy Street
Arlington, VA 22217

Naval Research Laboratory (6 copies)
Code 2627
Washington, D.C. 20375

Office of Naval Research
Director, Technology Programs
Code 200
800 N. Quincy Street
Arlington, VA 22217

Psychologist
Office of Naval Research
Detachment, Pasadena
1030 East Green Street
Pasadena, CA 91106

LIST 4
MEDICAL

Commanding Officer
Naval Health Research Center
San Diego, CA 92152

Psychology Department
Naval Regional Medical Center
San Diego, CA 92134

Commanding Officer
Naval Submarine Medical
Research Laboratory
Naval Submarine Base
New London, Box 900
Groton, CT 06349

Commanding Officer
Naval Aerospace Medical
Research Lab
Naval Air Station
Pensacola, FL 32508

Program Manager for Human
Performance (Code 44)
Naval Medical R&D Command
National Naval Medical Center
Bethesda, MD 20014

Navy Health Research Center
Technical Director
P.O. Box 85122
San Diego, CA 92138

LIST 5
NAVAL ACADEMY AND NAVAL POSTGRADUATE SCHOOL

Naval Postgraduate School (3 copies)
ATTN: Chairman, Dept. of
Administrative Science
Department of Administrative Sciences
Monterey, CA 93940

U.S. Naval Academy
ATTN: Chairman, Department
of Leadership and Law
Stop 7-B
Annapolis, MD 21402

Superintendent
ATTN: Director of Research
Naval Academy, U.S.
Annapolis, MD 21402

LIST 9
OTHER FEDERAL GOVERNMENT

Defense Advanced Research
  Projects Agency
Director, Cybernetics
  Technology Office
1400 Wilson Blvd, Rm 625
Arlington, VA 22209

Dr. Douglas Hunter
Defense Intelligence School
Washington, DC 20374

Dr. Brian Usilaner
GAO
Washington, DC 20548

National Institute of Education
EOLC/SMO
1200 19th Street, N.W.
Washington, DC 20208

National Institute of Mental Health
Division of Extramural Research Programs
5600 Fishers Lane
Rockville, MD 20852

National Institute of Mental Health
Minority Group Mental Health Programs
Room 7 - 102
5600 Fishers Lane
Rockville, MD 20852

Office of Personnel Management
Office of Planning and Evaluation
Research Management Division
1900 E Street, N.W.
Washington, DC 20415

Chief, Psychological Research Branch
U.S. Coast Guard (G-P-1/2/TP42)
Washington, D.C. 20593

Social and Developmental Psychology
  Program
National Science Foundation
Washington, D.C. 20550

Dr. Earl Potter
U.S. Coast Guard Academy
New London, CT 06320

~~Division of Industrial Science~~
~~& Technological Innovation~~
~~Productivity Improvement Research~~
~~National Science Foundation~~
~~Washington, D.C. 20550~~

~~Douglas B. Blackburn, Director~~
~~National Defense University~~
~~Mobilization Concepts Development~~
~~Center~~
~~Washington, D.C. 20319~~

Chairman, Dept. of Medical Psychology
School of Medicine
Uniformed Services University of
  the Health Sciences
4301 Jones Bridge Road
Bethesda, MD 20814

LIST 10
ARMY

~~Headquarters, FORSCO[illegible]~~
~~ATTN: AFPR-HR~~
~~Ft. [illegible]erson, [illegible]A 30330~~

~~Army Re[illegible]h Institute~~
~~Field [illegible]it [illegible]eavenworth~~
~~P.O. [illegible]ox 3122~~
~~Fo[illegible] Leavenworth, [illegible] [illegible]6027~~

Technical Director
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

(3 copies)

Head, Department of Behavior
Science and Leadership
U.S. Military Academy, New York 10996

Walter Reed Army Medical Center
W. R. Army Institute of Research
Division of Neuropsychiatry
Forest Glen
Washington, D.C. 20012

~~Army Military Personnel Co[illegible]d~~
~~Attn: DAPC-OE~~
~~[illegible]0 Stovall Street~~
~~Al[illegible]andria, VA 2[illegible]2~~

~~Resea[illegible] Pa[illegible]ologist~~
~~Selecti[illegible] Classification Performance~~
~~Meas[illegible]t Team~~
~~Army [illegible]earch Institute~~
~~At[illegible]tion: PERI[illegible] (Mr. Dennis Leedom)~~
~~[illegible] Eisenhower Av[illegible]e~~
~~[illegible]exandria, VA 22333~~

Commanding Officer
Organizational Effectiveness Center & School
Fort Ord, CA 93941

LIST 11
AIR FORCE

Air University Library
LSE 76-443
Maxwell AFB, AL 36112

Head, Department of Behavioral
Science and Leadership
U.S. Air Force Academy, CO 80840

MAJ Robert Gregory
USAFA/DFBL
U.S. Air Force Academy, CO 80840

~~AFOSR/NL~~
~~Building 410~~
~~Bolling AFB~~
~~Washington, DC 20332~~

~~Department of the Air [illegible]rce~~
~~HQUSA[illegible]/MPXHL~~
~~Pentago[illegible]~~
~~Washingto[illegible] DC [illegible]0330~~

~~Technical D[illegible]or~~
~~AFHRL/MO[illegible])~~
~~Brook[illegible]AFB~~
~~San [illegible]ntonio, TX 7823[illegible]~~

~~[illegible]FMPC/MPCYPR~~
~~Randolph AFB, TX 78150~~

LIST 12
MISCELLANEOUS

Australian Embassy
Office of the Air Attache (S3B)
1601 Massachusetts Avenue, N.W.
Washington, D.C. 20036

British Embassy
Scientific Information Officer
Room 509
3100 Massachusetts Avenue, N.W.
Washington, DC 20008

Canadian Defense Liaison Staff,
Washington
ATTN: CDRD
2450 Massachusetts Avenue, N.W.
Washington, DC 20008

Commandant, Royal Military
College of Canada
ATTN: Department of Military
Leadership and Management
Kingston, Ontario K7L 2W3

National Defence Headquarters
DPAR
Ottawa, Ontario K1A OK2

~~Mr. Luigi Petrullo~~
~~2431 North Edgewood Street~~
~~Arlington, VA 22207~~

Sequential by Principal Investigator

LIST 13
CURRENT CONTRACTORS

Dr. Clayton P. Alderfer
Yale University
School of Organization and Management
New Haven, Connecticut 06520

Dr. Janet L. Barnes-Farrell
Department of Psychology
University of Hawaii
2430 Campus Road
Honolulu, HI 96822

Dr. Jomills Braddock
John Hopkins University
Center for the Social Organization
of Schools
3505 N. Charles Street
Baltimore, MD 21218

Dr. Sara Yogev
Northwestern University
Graduate School of Management
2001 Sheridan Road
Evanston, IL 60201

Dr. Terry Connolly
University of Arizona
Department of Psychology, Rm. 312
Tucson, AZ 85721

Dr. Richard Daft
Texas A&M University
Department of Management
College Station, TX 77843

Dr. Randy Dunham
University of Wisconsin
Graduate School of Business
Madison, WI 53706

List 13 (continued)

Dr. J. Richard Hackman
School of Organization
and Management
Box 1A, Yale University
New Haven, CT 06520

Dr. Wayne Holder
American Humane Association
P.O. Box 1266
Denver, CO 80201

Dr. Daniel Ilgen
Department of Psychology
Michigan State University
East Lansing, MI 48824

Dr. David Johnson
Professor, Educational Psychology
178 Pillsbury Drive, S.E.
University of Minnesota
Minneapolis, MN 55455

Dr. Dan Landis
The University of Mississippi
College of Liberal Arts
University, MS 38677

Dr. Frank J. Landy
The Pennsylvania State University
Department of Psychology
417 Bruce V. Moore Building
University Park, PA 16802

Dr. Bibb Latane
The University of North Carolina
at Chapel Hill
Manning Hall 026A
Chapel Hill, NC 27514

Dr. Cynthia D. Fisher
College of Business Administration
Texas A&M University
College Station, TX 77843

Dr. Thomas M. Ostrom
The Ohio State University
Department of Psychology
116E Stadium
404C West 17th Avenue
Columbus, OH 43210

Dr. William G. Ouchi
University of California,
Los Angeles
Graduate School of Management
Los Angeles, CA 90024

Dr. Robert Rice
State University of New York at Buffalo
Department of Psychology
Buffalo, NY 14226

Dr. Benjamin Schneider
Department of Psychology
University of Maryland
College Park, MD 20742

Dr. H. Wallace Sinaiko
Program Director, Manpower Research
and Advisory Services
Smithsonian Institution
801 N. Pitt Street, Suite 120
Alexandria, VA 22314

Dr. Eliot Smith
Psychology Department
Purdue University
West Lafayette, IN 47907

Dr. Barbara Saboda
Public Applied Systems Division
Westinghouse Electric Corporation
P.O. Box 866
Columbia, MD 21044

Dr. Harry C. Triandis
Department of Psychology
University of Illinois
Champaign, IL 61820

Dr. Anne S. Tsui
Duke University
The Fuqua School of Business
Durham, NC 27706

Dr. Andrew H. Van de Ven
University of Minnesota
Office of Research Administration
1919 University Avenue
St. Paul, MN 55104

Dr. Sabra Woolley
SRA Corporation
901 South Highland Street
Arlington, VA 22204

END

FILMED

4-85

DTIC